

M.S. in Data Science

Introduction

The Master of Science in Data Science degree program is designed to prepare students to use the latest computational and analytic tools to solve data intensive problems that arise in business, industry or government. The goal is to provide the students with the knowledge and skills of data collection, pre-processing, analysis, visualization and ethical implication associated with large heterogeneous data arising within the various domain areas.

All the core courses within the degree program are project-based allowing for hands-on experience culminating in a final capstone project or an internship in the student's chosen domain area. The program offers the flexibility for the students to choose one of the five tracks (Aerospace Engineering, Aviation Safety, Aviation Business, Cybersecurity, High Performance Computing and Big Data, and Homeland Security) to specialize in, depending on their interest. The students have to choose the track by the start of the second semester into the program.

Admissions Criteria

Students will:

- Apply data mining and database knowledge to identify, retrieve, cleanse and store data.
- Apply their learning from project-based coursework to solve new unknown problems.
- Apply knowledge of statistical inference and machine learning tools to real industry applications obtained by methods including, but not limited to, case studies or detailed literature reviews.

Degree Requirements

The curriculum consists of 15 credits of required coursework, with an additional 3 credits of track-specific required course and 12 credits of electives and/or thesis research.

The core courses provide the foundation of the Data Science principles and require an undergraduate degree in a technical field (a degree with at least four semesters of college-level Math) for preparation. Students with a non-technical undergraduate degree will be required to complete additional modules

Program Core

CS 540	Database and Information Retrieval	3
DS 540	Data Mining	3
DS 544	Data Visualization	3
DS 615	Data Modeling	3
MA 506	Probability and Statistical Inference	3
Total Credits		15

Aerospace Engineering Track

Required Courses

AE 514	Introduction to the Finite Element Method	3
AE 516	Computational Aeronautical Fluid Dynamics	3
AE 523	Linear Systems	3
Select one of the following		3
AE 5XX	Aerospace Engineering Elective	
EP 501	Numerical Methods for Engineers and Scientists	
MA 532	Numerical Linear Algebra for Engineers	
Total Credits		12

Aviation Business Track

Electives - Select 12 hours from the following:		12
ACC 517	Accounting for Decision Making	
BA 511	Operations Research	
BA 523	Advanced Aviation Economics	
BA 610	Airline Optimization and Simulation Systems	
BA 612	Data Analytics for Aviation Business	
BA 645	Airport Operations and Management	
FIN 518	Managerial Finance	
FIN 621	International Aviation Finance	
FIN 623	Aircraft Funding Legal and Financial Analysis	
Total Credits		12

Aviation Safety Track

Electives - Select 12 hours from the following:		12
MSA 516	Applications in Crew Resource Management	
MSA 545	Human Factors in the Aviation/Aerospace Industry	
MSA 611	Aviation/Aerospace System Safety	
MSA 621	Aviation/Aerospace Safety Program Management	
MSA 628	Data Analytics for Aviation Safety	
Total Credits		12

Cybersecurity Track

Electives - Select 12 hours from the following:		12
CS 525	Current Topics in Cybersecurity	
CS 527	System Exploitation and Penetration Testing	
CS 528	Multi-Agent Systems	
CS 529	Computer Security	
CS 532	Software Security Assessment	
CS 538	Applied Cryptography	
CS 602	Big Data Analytics for Cybersecurity	
DS 625	Data Compression for Image and Signal Processing	
Total Credits		12

High Performance Computing & Big Data Track

Electives- Select 12 hours from the following:		12
DS 625	Data Compression for Image and Signal Processing	
MA 510	Fundamentals of Optimization	
MA 553	High Performance Scientific Computing	
MA 605	Statistical Quality Analysis	
MA 630	Complex Networks and Applications	
Total Credits		12

Homeland Security Track

Electives - Select 12 hours from the following:		12
HS 602	Data Analytics for Counterterrorism	
MHSR 500	Introduction to Human Security	
MHSR 511	The Internet, Security, and Governance	
MHSR 515	International Law and U.S. Security Policy	
MHSR 520	Principles of International Conflict Resolution	
MHSR 530	Environmental Security	
MHSR 540	Foundations of Resilience	
Total Credits		12

Human Factors Track

Electives - Select 12 hours from the following:	12
HFS 515 Ergonomics	
HFS 600 Human Factors in Systems	
HFS 615 Sensation and Perception	
HFS 620 Memory and Cognition	
HFS 624 User Experience	
HFS 635 Human-Computer Interaction	
Total Credits	12
Capstone Project or Thesis	3
MA 680 Data Science Capstone Project or CEDS 696 Co-Op Education Data Science Track specific elective (Thesis) *	
Total Credits	3
Total Degree Credits	30

* MA 700 Thesis (registration of 6 hours, with the other 3 hours replacing one elective from chosen track)

Suggested Plan of Study

Year One

	Credits
MA 506 Probability and Statistical Inference	3
CS 540 Database and Information Retrieval	3
DS 540 Data Mining	3
DS 544 Data Visualization	3
Specified Electives	6
Credits Subtotal	18.0

Year Two

DS 615 Data Modeling	3
MA 680 Data Science Capstone Project	3
Specified Electives	6
Credits Subtotal	12.0
Credits Total:	30.0